Explaining under-qualification of Low Educated

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Underqualification as an opportunity for low-educated workers

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Abstract**

Improving the labour market position of low-educated workers is one of the most important goals of regional labour market policy. Underqualification, meaning fulfilling a job at a higher level than expected based on one's formal education, can be valued as such a favourable position, both from the perspective of the individual and the policy. In this study, we use repeated cross-sections of data of Dutch workers from the period 1996-2006 to relate the chance for underqualification to personal, firm and labour market characteristics.

In brief, we find that for low-educated workers, firm and personal characteristics are more important than regional characteristics in explaining underqualification. Higher regional unemployment rates lower the chance to be underqualified. Working in smaller firms or firms with many high-skilled jobs has a strong positive effect on the chance to arrive in higher-level jobs, while working in firms with many high-educated workers lowers this chance. Women and non-natives are less often, whereas older workers are more often underqualified. More insight in the determinants of underqualification is important in order to develop more effective policy measures aiming to improve the labour market position for the most vulnerable groups on the labour market.

Keywords: underqualification, low-educated, low-skilled, regional labour market

1. Introduction

One of the key elements in regional policy is the development of a place-based local skills strategy (OECD, 2012; 2011a; 2011b; McCann and Ortega, 2011). In the global context of demographic change, technology shifts, globalisation, human capital mobility and changing occupational structures affecting every region in some way, it is important to upgrade the skill base to fulfil future skill demands. Besides attracting and retaining high-skilled workers and integrating disadvantaged groups, upgrading the low- educated who are already in employment to a better job position is important (OECD, 2012; 2009). Upgrading is not only an essential ingredient for successful individual career paths, it is also a way to create job openings at the lower skills levels on the labour market, especially for those with lower productivity levels who can only successfully enter the labour market by doing simple and elementary tasks.

However, little is known about labour market conditions under which low-educated workers are able to reach better job positions. Research dealing with job allocation mainly takes on a negative perspective by claiming that skill mismatches are unwanted, corroborated by a huge body of empirical research (Desjardins and Rubenson, 2011; Quintini, 2011). They link skills mismatches to negative productivity consequences on a regional or national level (Sattinger, 1993). People working in job levels that are too high are assumed to be less productive because of a shortage of (formal) qualifications, while people working in jobs below their formal education level are expected to be less motivated, also negatively impacting their productivity levels (f.i. Battu, Belfield and Sloane, 2000; Verheast and Omey, 2006).

However, looking into this topic with a specific focus on the low-educated can put things in a more positive perspective. From a policy point of view, more low-educated workers working in stronger job positions might lead to financial gains as less governmental support might be needed. Moreover, it signifies that governments manage to upgrade their labour force. An additional consequence could be more job openings in the lower areas of the labour market. From the micro-perspective of an individual worker, working in higher-level jobs is supposedly financially attractive (e.g. Allen and Van der Velden, 2008; Cohn and Khan, 1995), while the opposite (working in lower-level jobs) has negative financial consequences.

The OECD Employment Outlook 2012 (2011: 200) shows that of the total of (self-) employed workers, an unweighted average of 25,3% works in lower-level jobs, and 22,3% works in higher-level jobs than could be expected based on their formal education. The first situation is defined as overqualification, the second as underqualification. In addition to these more or less objective measures, the OECD presents figures of over- and under-skilling based on a worker's own interpretation of his or her skills level compared to the skills level they perceive to be required for the job they perform. Focusing on the ones working in higher-level jobs, only approximately 12% of formally underqualified workers also interpret themselves to be under-skilled (OECD, 2011). This means that 88% of formally underqualified workers do not think they need more skills to sufficiently perform their jobs. Following the heterogeneous skill theory (Green and McIntosch, 2002) the OECD concludes that the variation of skills of individuals with the same qualifications plays a key role in explaining differences in educational and skills mismatches. Variation of skills can occur through a variety of reasons, ranging from

subjective differences in people's self-image to more objective heterogeneity in skills between people with very similar formal education. Also, all kinds of aspects related to experience and learning lead to the development of skills during the working career, which makes the study of job mismatch rather complex (Quintini, 2011). Especially the latter aspect is relevant from a policy perspective: is it possible to define environments in which people are more likely to learn, to develop skills and be more successful on the job market?

We could think of arguments to advocate a distinction between high and low- educated workers in studying this topic. Firstly, the negative situation of overqualification or over-skilling is more related to the higher-educated, while in the situation of a low-educated worker, underqualification is likely to be more relevant. For the low-educated, nearly all jobs are at a higher level and elementary jobs for which almost no skills are needed are relatively scarce (Hensen, de Vries and Cörvers, 2009). Secondly, as all kind of positive and negative interaction effects between high and low-educated workers on the labour market occur (Gesthuizen and Scheepers, 2010) we might expect the situation and explanatory effects for the low-educated to differ from those of the high-educated.

Following this line of reasoning, the aim of this paper is to gain more insight into situations in which the low-educated are underqualified. Personal, firm and labour market characteristics will be analysed to see which characteristics lead to a higher chance for better job positions. What is the role of the regional level compared to the firm level? Do we find negative competition and/or positive knowledge spill-overs in situations where the high-educated are in the proximity of low-educated workers? Age will be used as a proxy for learning and labour market experience. Next to checking the linearity of this

effect, we investigate whether this age/experience effect on the chance to be underqualified varies for different groups of workers. In other words: are there differences in this effect of age/experience between certain groups of workers on the labour market? Two ways of measuring underqualification will be used to verify our findings.

To study these issues, we analyze an extensive representative panel dataset of Dutch workers in the Netherlands from the period 1996-2006, including data on the employees' educational levels as well as the skill complexity of their jobs. Because workers in a firm and firms within a region are selected in a representative way, it is possible to aggregate information about workers at both the firm and the regional level (for example, we could calculate the percentage of workers in a firm with a certain level of education).

In the next section we will describe a theoretical framework, followed by the empirical part in which our data, method and results are presented. We finish with some concluding remarks. Briefly, our results show that in some cases, the factors that determine the job mismatch are different for low-educated when compared to studies on all workers in general. Firm effects and personal characteristics are found to be more important than labour market aspects in explaining underqualification among the low-educated. We find evidence for the occurrence of substantial learning and experience effects during the working career. However, these effects are not equally strong for all groups of workers.

2. Theoretical framework

The presence of a job mismatch can be the result of the regional labour market situation, the organisation of work within the firm and of individual variation in skills and

experience throughout the working career. In this paragraph these factors will be discussed in more detail.

To look into the former, one branch of literature states that the overall mismatch is actually a genuine mismatch and a consequence of an uneven development of the occupational structure and educational characteristics of the labour force. For one thing, it is widely acknowledged that as a result of ongoing globalization, the qualification structure of most western labour markets is polarizing and the number of medium-level jobs is decreasing because of computerization and export of tasks towards developing countries (e.g. Autor, Katz and Kearney, 2006; Autor, Levy and Murnane, 2003; Spitz-Oener, 2006; Goos and Manning, 2007; Sassen, 2000; van der Waal, 2010). This process restructures labour markets towards more advanced services on the one hand, resulting in a high demand for high-skilled labour, and a group of supporting elementary and low-wage jobs on the other hand (Sassen, 1988). Others argue that the nationwide investments in educational attainment of the last decades left us with an overqualified labour force for which no sufficient jobs are available, also because educational levels seem to increase faster than job levels (Huijgen, 1989; Wolbers, Graaf and Ultee, 2001; Wolf, 2002). Within this context, the position of the low-educated is particularly important. Depending on the local occupational structure, the number of medium and low-skilled jobs might decline and competition for jobs with the higher-educated may increase as there are not enough jobs on a higher job level, with the consequence that they might be suppressed into the lowest jobs or even unemployment (Gesthuizen and Scheepers, 2010; Hensen, et al, 2009, Thurow, 1975).

However, the interaction between the high- and low-educated can also be explained from a more positive point of view. The presence of high-educated workers is often related to all kinds of positive spill-over effects on the region (f.i. Rodríguez-Pose and Tselios, 2010), and the firm (Broersma, Edzes and van Dijk, 2010; Canton, 2009). Low-educated can benefit because of a higher abundance of better jobs or by more possibilities to learn in a more informal setting, especially when workers are close to each other (f.i. Boschma, 2005). These circumstances can lead to better chances for the low-educated to work in high-skilled jobs.

The structure of the regional labour market in terms of economic sectors, firm size and type in relation to the labour force is very relevant in explaining the occurrence of (mis)matches and interactions. Demand and supply may differ between regional labour markets and may impact chances. There is not much literature in which regional characteristics are included to explain individual job-(mis)match, and particularly not in relation to underqualification. In available literature, findings are mainly based on workers in general, without distinguishing between workers with different educational levels. Most of these studies point to a positive relationship between urbanity and job chances in general (Hensen et al, 2009; Yankow, 2009). However, with respect to the low-educated, we might question whether they are really better off in urban areas as more competition may be experienced when the high- educated are attracted to the bigger cities and take the best jobs. Concerning the relationship between regional unemployment and market insufficiencies, contradicting results are found. For workers in general, Groot & Maassen van den Brink (2000) find no effect of unemployment on the chances for underqualification based on a meta-analysis. Hensen et al (2009) even find a positive

relation between unemployment and the chance for at least a job match for graduates in the period 1996-2001. Here also, the situation for the low-educated may be different. As they have to compete with the higher-educated for scarcer jobs (the labour queue effect; see Thurow, 1975, in which the highest-educated will be picked first), we can expect them to have less possibilities to be underqualified in situations with more regional unemployment. From the same reasoning we might expect better possibilities in periods of economic boom and deteriorating chances in worse economic situations.

In search for work on the labour market, workers are confronted with different types of firms in which they find a job. Some studies relate firm characteristics to the situation of underqualification, again for all workers in general and mixed results are found. Green and McIntosh (2007) find a higher chance for underqualification in public sectors, while a report of the OECD (2011) shows the opposite. Again, based on a comparison of these two studies, mixed results are found with respect to firm size. Probably this has something to do with differences between educational groups. It is likely that there are more promotional chances in bigger firms which in turn may have positive consequences for the high-educated in terms of underqualification. However, from the perspective of the low-educated worker, more competition within bigger firms from the higher-educated workers attracted to these kinds of firms may negatively affect their chances. In contrast, workers in smaller firms often perform a broader range of tasks, which might have a positive effect on the job level for the low-educated, but a negative effect for the high-educated. Besides, informal learning is probably more often present in smaller firms where workers are closer (Boschma, 2006) which is especially profitable in the case of the lower-educated. From studies of Canton (2009) and Broersma et al (2011) we know

that in general, firm aspects are much more important than labour market effects in explaining success of workers in terms of wages.

A third way of explaining job match differences is by personal and job characteristics. With respect to age, most research finds that underqualification increases with age and experience (e.g. Alpin, Shackleton and Walsh, 1998; OECD, 2011b; Sloane, Battu and Seaman, 1999; Wolbers, 2003), while overqualification may compensate for a lack of experience and enterprise-related schooling (Groot, 1993) or be part of a career mobility or insertion process in the labour market (Groot and Maassen van den Brink, 2000). From this we might expect to measure at least some evidence of informal learning by taking into account the effect of age. In addition, several authors find that men are more often underqualified compared to women (Alba-Ramirez, 1993; Alpin, et al, 1998; Daly, Büchel and Duncan, 2000; Groot and Maasen van den Brink, 2000). Related to this, it is also found that part-time workers are less often underqualified (Alpin et al, 1998; Sloane et al, 1999;). Both issues are often related to the position of women, giving birth and caring for children within the household, which often negatively affects their career. Another explanation may be the ongoing discrimination of women on the labour market (Böheim, Hofer and Zulehner, 2007). Concerning ethnicity, Alpin et al (1998) find a lower chance to be underqualified for ethnic minorities. As differences on the labour market based on gender and ethnicity slowly seem to decrease, we might expect differences between men and women and native and non-native workers in terms of underqualification to be larger for older workers. Other personal differences can come from skill heterogeneity and motivations of people. People with similar formal education

may have different skills. Personal voluntary motivations to work in lower-level jobs could also vary between workers..

3. Data and Method

Dataset used

To research the effect of regional, firm and personal characteristics on the chances of being underqualified, we use the Working Conditions Survey (WCS) from the Dutch Ministry of Social Affairs and Employment. The WCS is an annually matched employer-employee dataset. We have data for the period of 1996-2006. It is a stratified survey among firms in which a sample of employees working within these firms is also questioned. Each annual wave of the WCS comprises an average of 37,000 employees in about 2,000 firms. It is not a panel in the sense that firms and workers can be followed during a period, but it does comprise a repeated set of cross sections (of firms and associated workers for each year) through time.

The WCS includes a lot of background characteristics of both employees and firms, including a 2dg-zipcode level of the firm, which makes it possible to link regional data and to compose aggregated variables on the regional and firm level.

Dependent: Defining job match

Table 1 shows the distribution of workers within the dataset over job levels and educational levels. The job (skills) levels are based on a classification system consisting of eight levels. Level one (I) consist of very simple and repeating tasks, level eight (VIII) consist of managerial tasks when leading large firms. We observe that workers with a same education level are not restricted to one job (skill) level, but work on different

levels instead. A more detailed description of the Dutch educational system and the job-classification system can be found in Appendix 1 and Appendix 2.

Table 1: Number of workers by education and skill level

	I	II	III	IV	V	VI	VII	VIII	Total
Primary education (ISCED 0-1)	5459	**9580**	6103	404	42	5	0	0	21593
	25.28%	**44.37%**	28.26%	1.87%	0.19%	0.02%	0.00%	0.00%	100.00%
Pre-vocational secondary Education (ISCED 2)	3183	15586	**89376**	13831	947	67	2	0	122992
	2.59%	12.67%	**72.67%**	11.25%	0.77%	0.05%	0.00%	0.00%	100.00%
Lower secondary general education (ISCED 2)	2833	11031	**26211**	2990	420	46	4	0	43535
	6.51%	25.34%	**60.21%**	6.87%	0.96%	0.11%	0.01%	0.00%	100.00%
Higher secondary general education (ISCED 3)	501	2164	13803	**14322**	1976	200	11	0	32977
	1.52%	6.56%	41.86%	**43.43%**	5.99%	0.61%	0.03%	0.00%	100.00%
Secondary vocational education (ISCED 3-4)	172	1206	23550	**48981**	9394	685	30	0	84018
	0.20%	1.44%	28.03%	**58.30%**	11.18%	0.82%	0.04%	0.00%	100.00%
Higher professional education (ISCED 5)	30	234	2226	11633	**30433**	4618	194	3	49371
	0.06%	0.47%	4.51%	23.56%	**61.64%**	9.35%	0.39%	0.01%	100.00%
University (ISCED 5-6)	12	43	308	1290	4901	**6198**	530	17	13299
	0.09%	0.32%	2.32%	9.70%	36.85%	**46.61%**	3.99%	0.13%	100.00%
Total	12190	39844	**161577**	93451	48113	11819	771	20	367785
	3.31%	10.83%	**43.93%**	25.41%	13.08%	3.21%	0.21%	0.01%	100.00%

As referred to before, a worker's job allocation can be measured in several ways, by more objective and more subjective interpretations, and these distinctions in measurement could lead to different outcomes. Following Quintini (2011) we can identify three methods to determine whether a worker is over or underqualified. The first one is a normative approach in which a presumed connection is established between the employee's education and the skill level of the job, for instance between the Standard Occupational Classifications and educational levels. A second method of measurement is a statistical approach in which the observed distribution is taken as a starting point and the mean or mode of the distribution within an educational category is defined as the observed job match. A deviation from this mean or mode leads to under- or

overqualification. Finally, the self-declared measure uses individuals' own opinions. It incorporates learning and experience of workers during the working career and heterogeneity in skills. However, it could also be biased by differences in people's own interpretation about themselves.

As we want to gain more insight into the circumstances in which workers have opportunities to work in higher job levels, for example because of learning and experience, the latter measure is less suitable as it already corrects for these aspects. Moreover, we do not have information about people's own job interpretations. For these reasons we opted for an objective method of measurement. As we want to say something about the stability of our outcomes by using different measures, we compare a normative and a statistical approach in our analysis of underqualification.

Calculating normative and statistical measure of underqualification

To define the normative measure we made use of the Standard Occupational Classification system which formally links skill levels to educational levels. For each job level, the officially corresponding educational levels are available in the system. The situation of an individual worker is compared to this official classification. Working in a lower-level job than expected is defined as overqualification, while a worker is defined to be underqualified when his level of education is lower than the educational level which officially corresponds to the job.

The statistical measure is calculated by defining the mean job level for each educational level. The matching job level for each education level is the level which is closest to the mean. Working on a job level above the matched level is again defined as underqualification, while a job level below the matched level means a situation of over-

qualification. We checked whether taking the mode instead of the mean job level would lead to a noticeable change in results. However this was not found to be the case. Table 2 shows an overview of the statistics that belong to the different measures.

Table 2: Defining the job match based on a normative and statistical measure

	Number of cases with education level	Mean job level	St. dev.	Job match level based on normative measure	Job match level based on statistical mean
Primary education (ISCED 0-1)	21593	2.07	0.79	I	II
Pre-vocational secondary Education (ISCED 2)	43535	2.71	0.74	II + III	III
Lower secondary general education (ISCED 2)	122992	2.95	0.61	II + III	III
Higher secondar general education (ISCED 3)	32977	3.48	0.80	IV	III + IV
Secondary vocational education (ISCED 3-4)	84018	3.81	0.68	IV	IV
Higher professional education (ISCED 5)	49371	4.76	0.72	V+VI+ VII+ VIII	V
University (ISCED 5-6)	13299	5.39	0.85	V+VI+ VII+ VIII	V + VI
Total	367785	3.45	1.07		

Explanatory variables

On the regional level we include the regional unemployment rate, urbanity, and the percentage of high-educated workers and high-skilled job on the labour market. The 2dg-zipcode level which is the level on which the firm location is given, is used as the regional level of analysis.

With respect to the former, we linked the average unemployment rate over the period of analysis (1995-2006) to our dataset by 2dg zip-code, gathered from Statistics Netherlands. Despite a correction for the economic situation, the regional unemployment rate is quite stable, so it tells us something about the structure of the region. Urbanity, the

second characteristic, is included by taking along a dummy for working in one of the four biggest cities of the Netherlands (based on 2dg zipcodes which belong to these cities). In addition to these two structural characteristics, we add the percentage of the high-educated and of high-skilled workers in the region to look at the effect of regional spill-overs and competition. To calculate both, we aggregated workers in our dataset by 2dg zipcode, by educational level, and by job level by year. This led to a spatial distribution into 99 regions. The accumulated numbers were corrected for the specific firm in which the worker is working, resulting in a 'firm-specifically calculated' regional variable. The accumulated numbers are used to calculate percentages. A high correlation exists between the percentage of high-skilled jobs and the percentage of the highly educated within the firm or region. The reason that we include both variables is that we want to distinguish between possible negative competition and positive spill-over effects on the chances for the low-educated. Finally, we add the unemployment rate by year on the national level to cover the business cycle effect.

The firm characteristics we include are firm size and firm type, the latter again measured by the percentage of high-educated workers and high-skilled jobs, but now in the firm. The percentage of the high-educated and high skilled jobs is again calculated by aggregating workers but now on the firm level, in which the worker itself is excluded. This leads to 'worker-specific calculated' firm variables. Firm size is included on a ratio scale.

The last group of variables we add are personal and job characteristics; we include age, gender, ethnicity and working hours. Age, which we use as a possible indication for informal learning, is included in age groups to investigate whether chances for

underqualification are proportionally increasing over time. Four age groups are defined, 15-24, 25-34, 35-49 and 50 and above. With respect to gender and ethnicity we include a dummy for being female and being non-native. There is a significant group of workers with missing data for ethnicity. As we do not want to lose data, also a dummy for 'ethnicity unknown' is included. Working hours are included as a ratio variable.

In a model extension we include interaction effects to see whether the differences between men and women and native and non-native people are changing over time. To ease interpretation, we replace our four age groups for two groups, a group of workers being younger than 40 and a group with an age of at least 40. The interaction terms are calculated by multiplying this age dummy with respectively being women and being non-native.

Besides the personal, firm and labour market characteristics we focus on, we control for the year trend and the specific educational level (ISCED 1 or ISCED 2) of the worker. In addition we control for firm sector, like industry or agriculture, by including a set of dummies (13) of the firm and for the functional type (like having a manual-, an administrative or a management job), by including a set of respectively 6 dummies of the job.

Descriptives

All workers with an age above 15 and below 66 are selected. Because of our focus on the low-educated, we selected all workers with a low education level, which we defined based on their education level on maximally pre- vocational secondary education level or ISCED 2.

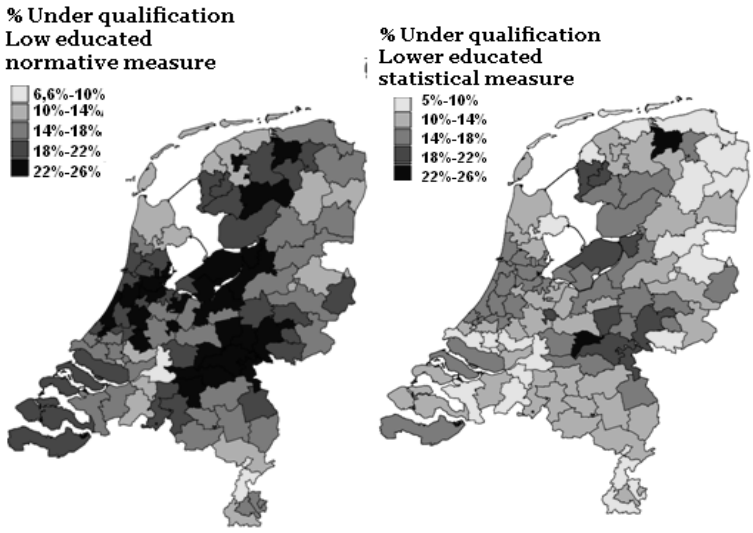
Table 3 shows the differences in job match for the low-educated based on the normative and the statistical measure. Based on the statistical measure, the number of respondents in a job match and in a position of underqualification is lower, while the percentage of overqualified people is higher compared to the normative measure. This latter aspect is due to the fact that people with the lowest education level (ISCED-1) are matched to the lowest skill level in the normative situation. That we do find people being overqualified on this level is because our group of low-educated workers consists of both the people with the lowest education level (ISCED-1) as well as people on ISCED-2 level. This latter group could be overqualified when working on the lowest job level (level I, see also table 2).

Table 3: Percentage low-educated by job allocation for the normative and statistical measure

Condition	**Resulting job match**	**Percentage of low-educated (ISCED 1-2) based on normative measure**	**Percentage of low-educated (ISCED 1-2) based on statistical measure**
Job level<Education level	Jobmatch=overqualified	3.2%	20.2%
Job level=Education level	Jobmatch=match	78.5%	66.6%
Job level>Education level	Jobmatch=underqualified	18.3%	13.2%
Total		100%	100%

Figure 1 shows the spatial distribution of the percentage of underqualified low-educated workers based on the normative- and the statistical measure over the period 1995-2006 in the Netherlands, based on our dataset. Because the overall level of underqualification is higher with the normative measure this is also reflected in the maps. However, the spatial distribution for both measures is largely the same, although on the detailed spatial level there are some differences. Especially in peripheral areas, the levels of underqualification for the low-educated seem to be the lowest, although there are exceptions.

Figure 1: Geographical spread of underqualification among low-educated workers



To distinguish the real success situations, we exclude all overqualified workers from the analyses. Table 4 shows descriptives of the final dataset which exists of low-educated workers with at least a job match (being in a match or being underqualified). Because of this focus, the total N in table 4 is lower compared to table 1 and 2, in which all workers are still included.

Table 4 Descriptives of group of low-educated workers with at least a job match for each measurement

		Normative measure	**Statistical measure**
		Mean/ pct **Std dev** **Min** **Max**	**Mean/ pct** **Std dev** **Min** **Max**
Individual characteristics			
Age 4 groups	16-24	16.5	13.1
	25-34	27.8	28.7
	35-49	37.5	38.9
	above 49	18.2	19.3
Age 2 groups	above 39	42.3	44.3
Gender	Female	31.4	27.4
Ethnicity	Native	65.8	66.3
	Not native	5.9	5.5
	Ethnicity unknown	28.2	28.3

Education	Primary education (ISCED1)	11.8				10.7			
	Pre- vocational secondary educ. (ISCED 2)	88.2				89.3			
Year									
	1995	7.4				7.1			
	1996	10.1				10.3			
	1997	10.3				10.4			
	1998	10.3				10.5			
	1999	10.0				10.1			
	2000	9.9				10.2			
	2001	11.7				11.4			
	2002	8.9				9.1			
	2004	11.0				10.5			
	2006	10.6				10.4			
Job characteristics									
Hours	Working hours per week	33.2	10.2	0.1	50.0	34.4	9.1	0.1	50.0
Function type	Technical manual labour	49.8				51.2			
	Administration	8.8				9.9			
	Automatics	0.4				0.5			
	Commercial	8.4				8.1			
	Nursing/provision of services	30.5				27.7			
	Creative	0.2				0.3			
	Management	1.9				2.3			
Firm characteristics									
Firm size	1 - 4	3.2				3.2			
	5 - 9	6.7				6.6			
	10 - 19	11.2				11.1			
	20 - 49	16.6				16.6			
	50 - 99	15.6				15.8			
	100 - 199	15.8				16.0			
	200 - 499	15.2				15.5			
	>= 500	15.7				15.2			
Sector	Agriculture and fisheries	2.9				2.7			
	Mineral extraction	0.6				0.6			
	Manufacturing	33.3				36.2			
	Energy and water control	1.3				1.5			
	Construction	10.3				11.5			
	Trade, repair of consumer art.	19.3				18.9			
	Hotels, restaurants. cafes	3.6				2.8			
	Transport, storage and communication	8.2				9.1			
	Financial institutions	1.4				1.6			
	Rental and business services	7.8				7.1			
	Public adm. social services	0.4				0.4			

	Education	0.4				0.4			
	Health and social services	6.4				5.9			
	Culture, recreation	4.0				3.9			
Type of firm	Perc. high educated in firm	8.2	0.1	0.0	100	8.6	0.1	0.0	100
	Perc. high skilled jobs in firm	9.1	0.1	0.0	100	9.7	0.1	0.0	100
Labour market characteristics									
Nation wide	Business cycle effect	1.04	0.03	1.04	2.59	1.83	0.01	1.04	2.59
Residental location	Regional average unemployment rate	1.83	0.01	3.23	10.3	5.41	0.01	3.23	10.3
Work location	Working 4 biggest cities	18.4				18.7			
	Percentage high educated	15.7	0.1	0.0	60.2	15.8	0.1	0.0	60.2
	Percentage high skilled jobs	15.4	0.1	0.5	55.9	15.5	0.1	0.5	55.9
Dependent									
Jobmatch	Percentage match	81.1				77.0			
	Percentage under qualified	18.9				23.0			
N		180074				148305			

Modelling technique

We estimate binary logistic regression models with clustered errors on zipcode (2dg) level to estimate the chance to be underqualified for a job with respect to having a job match. Clustering on firm level does not change the results significantly. We checked for multicollinearity issues between the independent variables. Both the normative and statistical measures of underqualification will be compared. We start the analysis with a model that includes the regional, firm and personal/job characteristics we described above. In the next step we add interaction effects with age, gender and ethnicity to the model.

4. Results

Table 5 shows the results of our binary logistic models. We describe respectively our findings on labour market-, firm- and personal characteristics in explaining underqualification.

Labour market characteristics

Generally, we can conclude that the labour market effects we included show only limited impact in explaining underqualification. More regional unemployment lowers the chance for underqualification of the low-educated although the coefficient is only significant at the 10%- level. These findings are in line with our assumptions regarding the low-educated and could be explained by high competition for jobs on these markets and negative labour queue effects for the low-educated (Thurow, 1975) and by contrasting the results with studies on workers in general not finding any kind of positive effect of unemployment on underqualification (Groot and Maassen van den Brink, 2000; Hensen et al, 2009).

Also with respect to urbanity, we deviate from other studies in general by finding positive effects on job positions (Yankow, 2009). We find that for the low-educated, working in a bigger city leads to a negative effect on underqualification. However this effect is only significant at the 10% level when a normative measure is used.

Instead, chances for the low-educated to be underqualified are slightly better within regions with a relatively high percentage of high skilled jobs, but again only in the situation of a normative measure and only measured on a 10% significance level. This may reflect that if more high skilled jobs are available, this creates more chances for the low-educated to get a job above their educational level. Interestingly, a relation between the percentage of high educated workers in the region and the chance to be underqualified is not found after correcting for the other variables in the model, which implies that no direct competition effects can be observed coming from the highest educated on the labour market.

Finally, we do not observe an effect of the business cycle on the chance to be underqualified for the low-educated. Probably the effect of economic prosperity is more directly relating to the job match outcomes for high educated while influencing the low-educated more indirectly through lower levels of unemployment (see f.i. Edzes, Hamersma and Van Dijk, 2011).

Firm characteristics

We find a negative significant stable relation between firm size and the chance to be underqualified on the 1% significance level. Again, our assumption is confirmed that the case of the low-educated differs from current research finding mixed results with relation to firm size. We can explain the negative effect by pointing to both the variety of tasks and the proximity of workers within smaller firms (Boschma, 2005) and more competition from the higher- educated in larger firms, which make chances for the low-educated in smaller firms seemingly better.

Although we did not find strong evidence for knowledge spill-overs and direct competition effects on regional levels, we do find strong and stable relations between the percentage of high-skilled jobs and the percentage of high-educated workers within the firm, and the chances for the low-educated. Chances to be underqualified are much better in firms with a high percentage of high-skilled jobs. At the same time, crowding-out effects seem to be present on the firm level as well; when the share of high-educated workers in the firm (controlled for the percentage of high-skilled jobs in the firm) increases, chances for the low-educated to work at higher-level jobs deteriorate. However, because the positive effect of the percentage of high-skilled jobs is much stronger than the negative effect caused by the percentage of high–educated workers, it

still seems interesting for the low-educated to be in environments in which they are in proximity of higher-skilled jobs.

Summarizing, we conclude that the firm effects we included are much more robust in explaining underqualification of the low-educated than regional labour market effects. This finding is in line with studies looking into interactions between high-educated and low- educated in explaining personal differences in salary, also finding that the firm level is more important in general (Broersma et al, 2011; Canton, 2009).

Personal- and job characteristics

In addition to regional and firm characteristics, personal and job characteristics are added to the model. We discuss our findings with respect to age, gender, ethnicity and working hours. In general the results we find with respect to the personal- and job characteristics we included are in line with other studies on the individual job match for all workers (Alba-Ramirez, 1993; Alpin et al, 1998; Daly et al, 2000; Frank, 1978; Sloane et al, 1999). We find that low-educated women, non-natives and people working fewer hours per week have a smaller chance to be underqualified. The results are stable when we compare both measures. Also, the negative effects for all younger age groups compared to the oldest group of workers are in line with our expectations and in line with other research, and indicate that the chance to be underqualified increases proportionally with age (e.g. Alpin et al, 1998; OECD, 2011; Sloane et al, 1999; Wolbers, 2003). The effects are approximately the same for both measurements.

Table 5: Modelling results binary logistic regression

Underqualification (1) vs job match (0)		**Normative measure**		**Statistical measure**	
		B	**z**	**B**	**z**
Labour market	Working in one of 4 biggest cities	-0.24	-1.89*	-0.15	-2.37
	Unemployment rate	-5.65	-1.71*	-4.96	-3.59*

	Percentage high-skilled jobs in region excl. firm	1.37	1.76*	0.35	0.56
	Percentage high-educated in region excl. firm	-0.58	-0.71	0.12	0.21
Firm type	Firm size	-0.08	6.58***	-0.07	-6.56***
	Percentage high-skilled jobs in firm excl. worker	4.02	16.22***	3.72	16.99***
	Percentage high-educated in firm excl. worker	-1.31	-5.03***	-1.21	-5.29***
	Business cycle	-1.02	0.169	-8.98	-1.36
Personal- and job characteristics	Gender = female	-0.93	-21.58***	-0.92	-24.27***
	Non-native	-0.59	-8.27***	-0.50	-8.33***
	Ethnicity unknown	-0.10	-1.07	-0.09	-1.11***
	Age 16 to 25 (ref. age 50+)	-1.43	-22.99***	-0.17	-28.76***
	Age 25 to 35	-0.89	-22.48***	-0.91	-29.11***
	Age 35 to 50	-0.29	-10.37***	-0.28	-12.24***
	Number of working hours per week	0.04	14.92***	0.04	15.17***
	Constant	7.88	3.79***	7.88	4.01***
	Controlled for education level	Yes		Yes	
	Controlled for firm sector	Yes		Yes	
	Controlled for functional types	Yes		Yes	
	Controlled for year trend	Yes		Yes	
	N	180047		148305	
	Pseudo R^2	0.369		0.215	
	Wald chi^2	6502.07		7081.32	
	Prob>chi^2	0.000		0.000	

Interaction with age

We can conclude from our first part of results that low-educated women and also non-natives have more difficulties to end in a position of underqualification. However, are their learning chances also different if we compare younger and older groups and have these differences increased or decreased recently?

Table 6 shows the coefficients of the interaction effects. As the effects of the other variables are hardly affected by the inclusion of interaction effects, we do not show them again in this table. We find that the age effect is smaller for women as well as for non-natives when compared to men and natives respectively. Discrimination on the labour market but also differences in career paths could explain this. Also cohort effects could

play a role here (as we used cross-sectional data) as differences have possibly become smaller recently

Table 6: Interaction effects age, women, ethnicity, city

Underqualification (1) vs job match (0)		**Normative measure**		**Statistical measure**	
		B	**z**	**B**	**z**
Single effects	Gender = female	-0.71	-16.39***	-0.86	-17.47***
	Non-native	-0.29	-5.11***	-0.23	-3.88***
	Age >39	0.93	30.53***	0.85	30.20***
Interaction effects	Non-native*age>39	-0.65	-5.96***	-0.55	-6.34***
	Women*age>39	-0.51	-9.57***	-0.18	-3.39***
	N	180047		148305	
	Pseudo R^2	0.37		0,21	
	Wald chi2(36)	6975,86		7072,57	
	Prob>chi2	0.00		0,00	

Overall fit

In general, the results are stable when we compare the normative- and statistical way of measurement. Although we find significant indicators in explaining the chance to be underqualified, the overall fit of the model indicates that there is still quite some variance left unexplained. Omitted variables but also personal heterogeneity could be important reasons for this.

5. Conclusions

From a policy perspective as well as from an individual perspective, job mismatches leading to underqualification can be evaluated as positive labour market outcomes, when we think in terms of learning effects and higher incomes on the micro-level and budget savings and upgrading of the labour force on the policy level. However, current research on job mismatch mainly deals with the negative consequences of overqualification and the relation to lower productivity levels. It lacks focus on any specific group on the labour market, which could lead to dispossessed generalizing of findings that ignore

differences by education and skill levels and might end up in inadequate recommendations. With this study we address both shortcomings by looking in detail into successful labour outcomes for low-educated workers. We compared regional, firm and personal characteristics and their impact to explain underqualification. Based on this we can draw some conclusions and come to some suggestions for policy and for further research.

First of all, our study indeed provides empirical evidence that studying underqualification could benefit from distinguishing between specific groups on the labour market. We show that the mechanisms at work are sometimes different for the low-educated, for example with respect to the relation with unemployment, urbanity and firm size.

Second, our study provides evidence that the regional labour market situation is less important compared to firm characteristics in explaining the chances for the low-educated to end up in better job positions. With respect to firm characteristics, we find that low-educated workers have better chances to be underqualified when working in smaller firms and in firms with many high-skilled jobs. However, when the number of high-educated workers exceeds the number of high-skilled jobs in the firm, chances for the low-educated to work in higher positions decrease. Nevertheless the positive effect of being in such firms is stronger than the negative competition effects which are likely to exist. With regard to the regional characteristics we included, no stable significant effects are found with respect to the type of region (in terms of high-skilled jobs percentage, high-educated workers percentage and urbanity), except for the small negative significant effect of structural unemployment on the chance to be underqualified . In addition we do not find a positive relation between economic prosperity and job positions for the low-educated.

From a policy perspective, more research is needed to shed light on positive working environments for the low-educated. For example with respect to the firm level, are positions better from the beginning (workers self-selecting into specific types of firms), or are these better positions reached by obtaining knowledge spill-overs during a longer time spent in a firm? Could we better classify specific firms and labour markets with favourable characteristics for specific groups on the labour market, for example if we think about matching supply and demand?

Third, although regional characteristics and especially firm characteristics have their impact, some personal characteristics are among the main explanatory variables in our models. In general, the effect of age/experience proportionally increases underqualification, meaning that older workers are more often underqualified. However, this age-effect is not the same for all groups of workers. In our results we separated this effect for women versus men and non-natives versus natives. Aside from the finding that women and non-natives are less often underqualified, the age effect for men and natives is also stronger than for women and non-natives. In other words: the difference between young and older workers is higher for men and natives, leading to the assumption that these groups have more possibilities to improve their position during their working career. However, the difference might also be an indication of a cohort effect indicating that discrimination and career differences are decreasing, leading to smaller differences for younger cohorts. Further research is required using longitudinal data which make it possible to follow workers over time.

Finally, our results show indications of learning during the labour market over the life-cycle. In addition, despite the several variables which were introduced in explaining

underqualification, still a lot of variance cannot be explained by our model. Personal heterogeneity could be a reason for this: people with the same educational level could differ in skills and in their motives, which makes that some people may be able to reach better labour market positions than others. This last point illustrates the usefulness of studying more subjective ways of under-skilling, as studies such as the OECD reports show that it does matter to take another perspective on skills. And more importantly, working on a more objective system for measuring people's true skills is worthwhile in order to get a better picture of the true scope of the 'problem' of job mismatch , as both using underqualification and people's own interpretation of skills have their drawbacks. More insight in these issues is essential in order to develop more effective policy measures aiming to improve the labour market position for the most vulnerable groups on the labour market.

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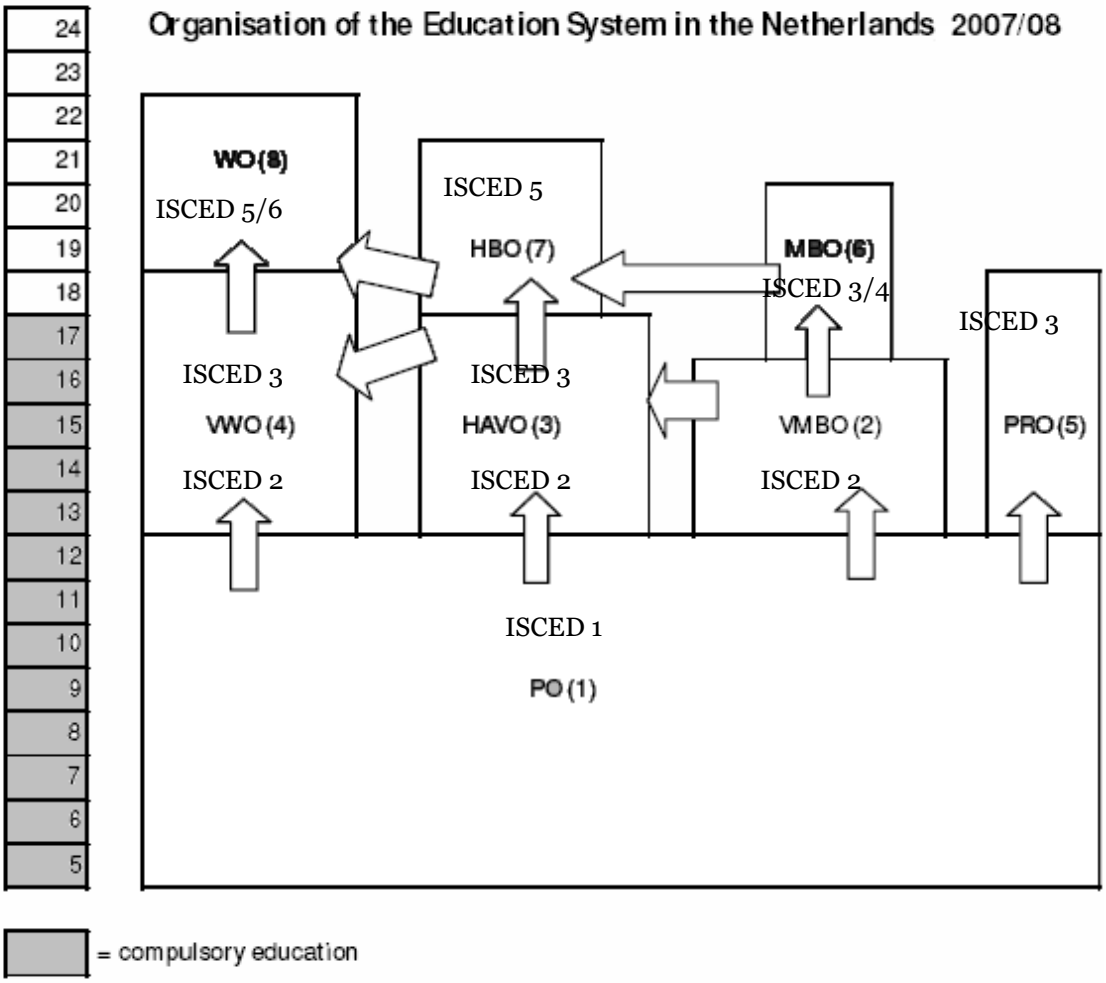
Appendix

Appendix 1: Job classification system

LTD Function level	Description of level	Linked to education level
I	Very simple labour activities, repetition, no schooling and marginal experience required, performed under direct supervision	Primary education (ISCED 1)
II	Simple or quite simple labour activities, repetition, some lower administrative or technical knowledge and some experience required. Requires some independence, performed under direct supervision	Pre-vocational secondary education (ISCED 2) + Lower secondary general education (ISCED 2)
III-low	Less simple labour activities, repetition, lower administrative or technical knowledge and some experience required, performed independently to a certain degree.	Pre-vocational secondary education (ISCED 2) + Lower secondary general education (ISCED 2)
III-high	Less simple labour activities, alternating, lower administrative or technical knowledge and a vocational education in a specific technique and some experience required, performed independently to a certain degree.	Pre-vocational secondary education (ISCED 2) + Lower secondary general education (ISCED 2)
IV	Difficult labour activities, medium administrative or technical level of knowledge plus experience required, intended to be performed independently.	Senior general secondary education and Pre-university Education (ISCED 3)+ Secondary vocational education (ISCED 3)
V	Composed labour activities within a specialism, higher knowledge level and/or experience required, performed independently	Higher professional education (ISCED 5)+ University (ISCED 5-6)
VI	Executive or policy-preparing labour activities, creative or communicative, independent point of view, academic knowledge level required	Higher professional education (ISCED 5)+ University (ISCED 5-6)
VII	Leading medium-sized units, participating in policy preparation and creation	Higher professional education (ISCED 5)+ University (ISCED 5-6)
VIII	Leading big firms/units	Higher professional education (ISCED 5)+ University (ISCED 5-6)

Appendix 2: Dutch educational system



1 primary education (PO)
2 pre-vocational secondary education (VMBO)
3 senior general secondary education (HAVO)
4 pre-university education (VWO)
5 practical training (PRO)
6 secondary vocational education (MBO): ½-4 yrs
7 higher professional education (HBO-bachelor)
8 university (WO-bachelor + -master)

Source: Ministry of Education, Culture and Science, 2007.

Appendix 3: Controls model

		Normative measure		Statistical measure	
		B	**z**	**B**	**z**
	Education	-4.56	-48.45***	-2.30	-42.57***
	Year	-0.04	-3.43***	-0.04	-3.85***
Function type	Techniqual manual labour	-1.65	-25.25***	-1.67	-26.22***
	Administration	-0.62	-8.50***	-0.68	-10.10***
	Automatics	-0.09	-0.76	-0.25	-1.80**
	Nursing/provision of services	-1.48	-21.17***	-1.33	-19.71***
	Creative	0.38	2.59**	0.36	2.19***
	Management	2.18	25.84***	1.90	22.55***
Firm sector	Agriculture and fisheries	-0.26	-1.84*	-0.26	-2.25**
	Mineral extraction	0.36	1.95**	0.39	2.12**
	Energy and water control companies	0.71	5.28***	0.59	4.61***
	Construction	-0.05	-0.76	-0.05	-0.71
	Trade and repair of consumer articles	-0.06	-1.04	-0.19	-3.50***
	Hotels. restaurants. cafes	0.26	2.43**	0.12	0.99
	Transport. storage and communication	1.08	9.75***	0.91	10.58***
	Financial institutions	0.44	3.73***	0.45	3.51***
	Rental and business services	-0.46	-3.53***	-0.13	-1.57
	Public adm. mandatory social services	0.57	2.55**	0.55	2.27**
	Education	0.04	0.13	0.04	0.14
	Health and social services	0.33	2.88***	0.16	1.28
	Culture. recreation and other services	0.21	1.33	-0.01	-0.06